

Strategizing Megaproject

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Class summary

Modeling strategy is the key to the success of a project especially in a megaproject. We take an imaginary project with 9 plots as a study subject. Each plot has a podium and more than 3 towers on top of it. As a multi-families residential project, the design is based on typical unit types and prototype floors repeatedly placed on levels of the towers. With more than 40 structures, more than 30 unit types and more than 20 prototype floor plans are scattered in more than 30 towers across the entire site. How can we manage a project with so many models linked together? How can we maintain numerous unit types and prototype floors as design keeps changing during the design process and development? Group, link, family strategies will be explored and an innovative method will be developed to face the challenge.

Key learning objectives

At the end of this class, you will be able to:

- analyze repetition in a megaproject
- strategize linking in a megaproject
- evaluate different strategies: group, link and family
- maintain and manage numerous models and contents in a megaproject

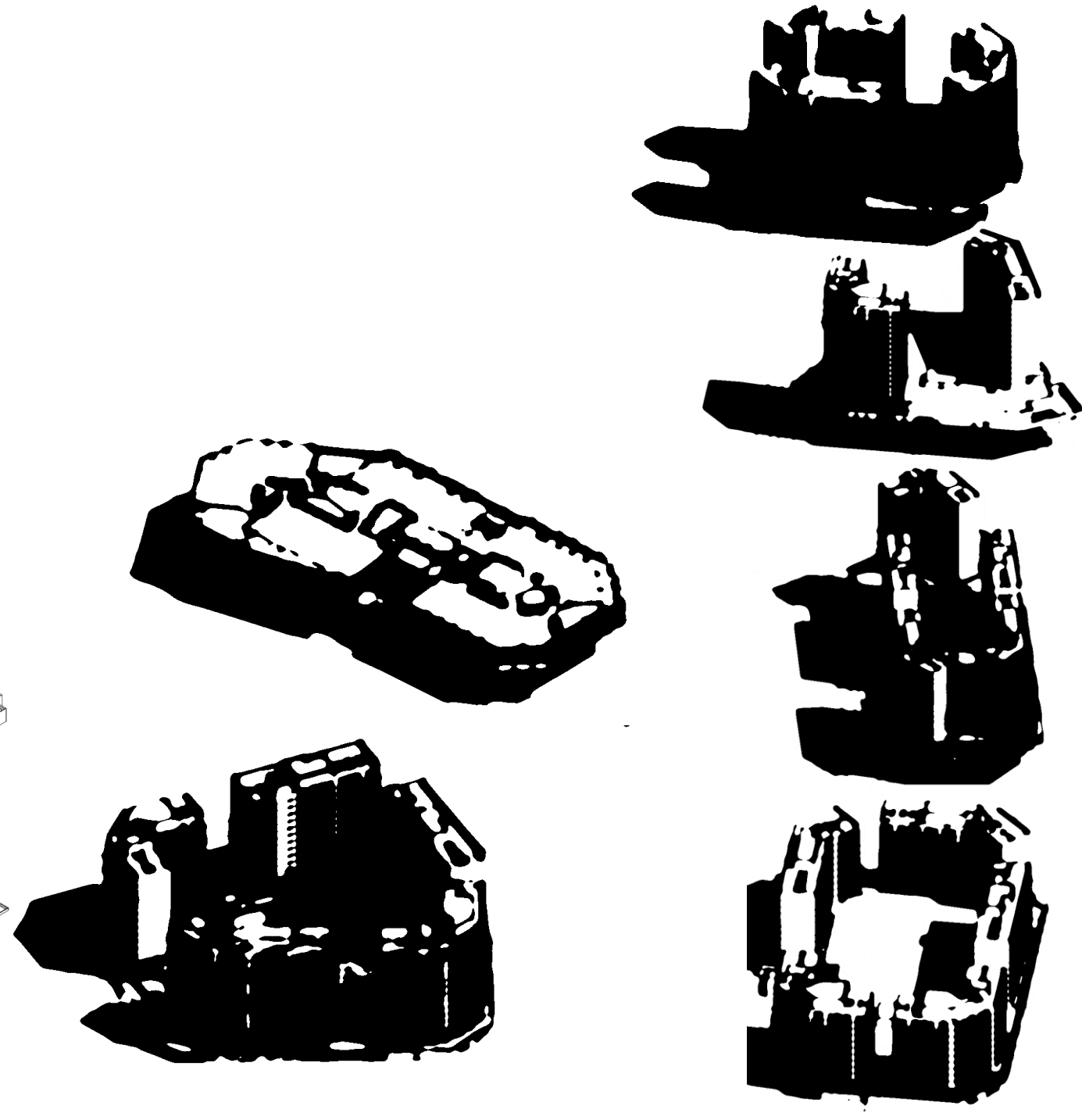
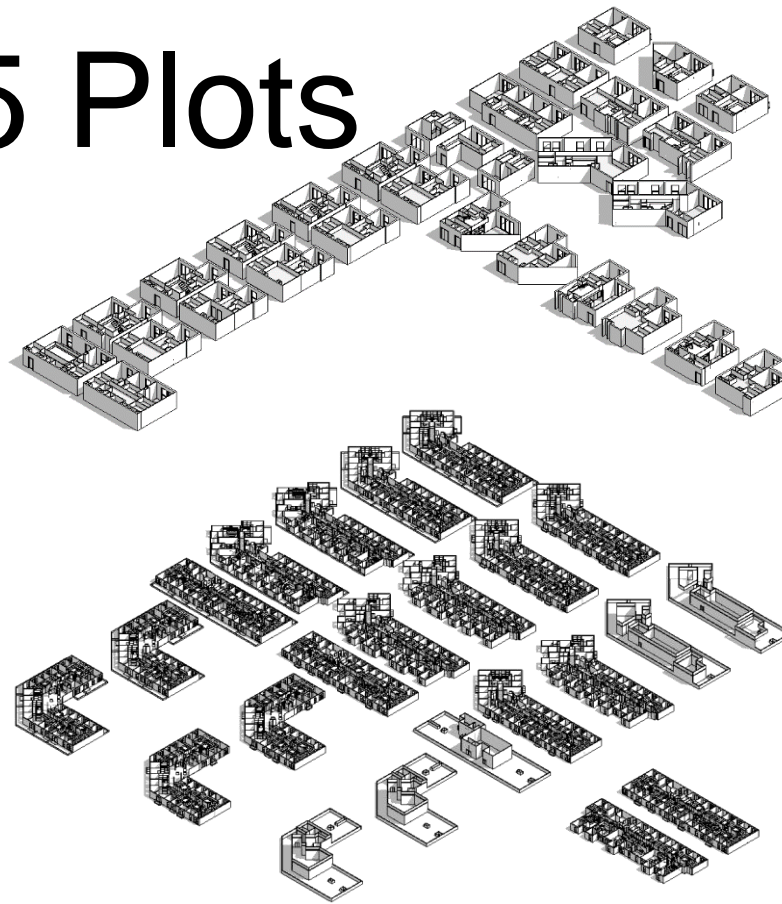


CHALLENGE





CHALLENGE

- 30 Unit types
- 23 Prototypes
- 11 Tower types
- 20 Towers on 5 Plots

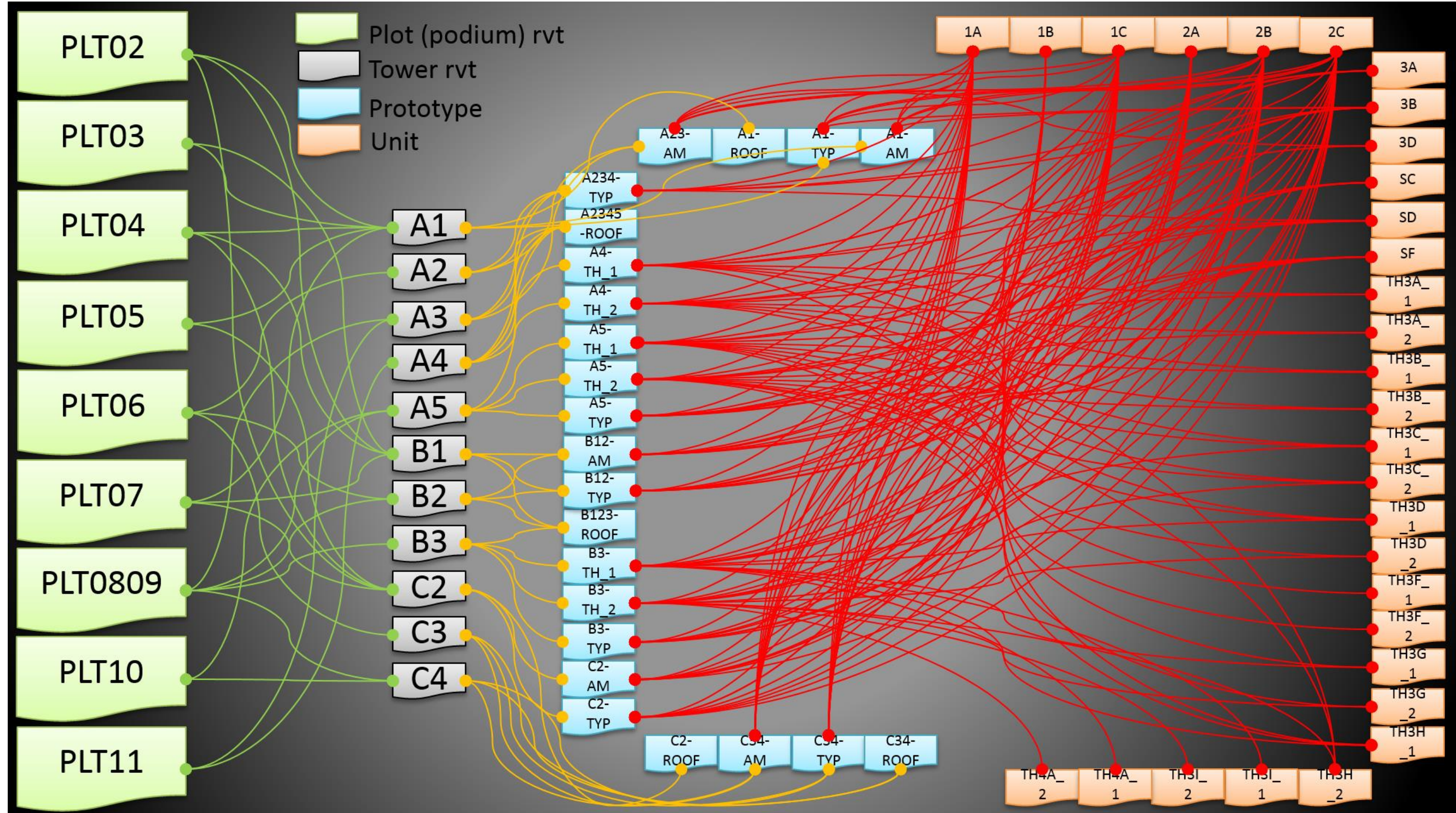


- Units – Prototypes – Towers - Plots


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CHALLENGE



OPTIONS

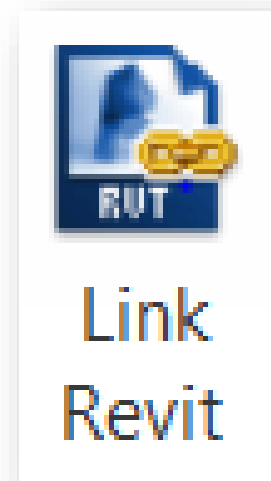


OPTIONS

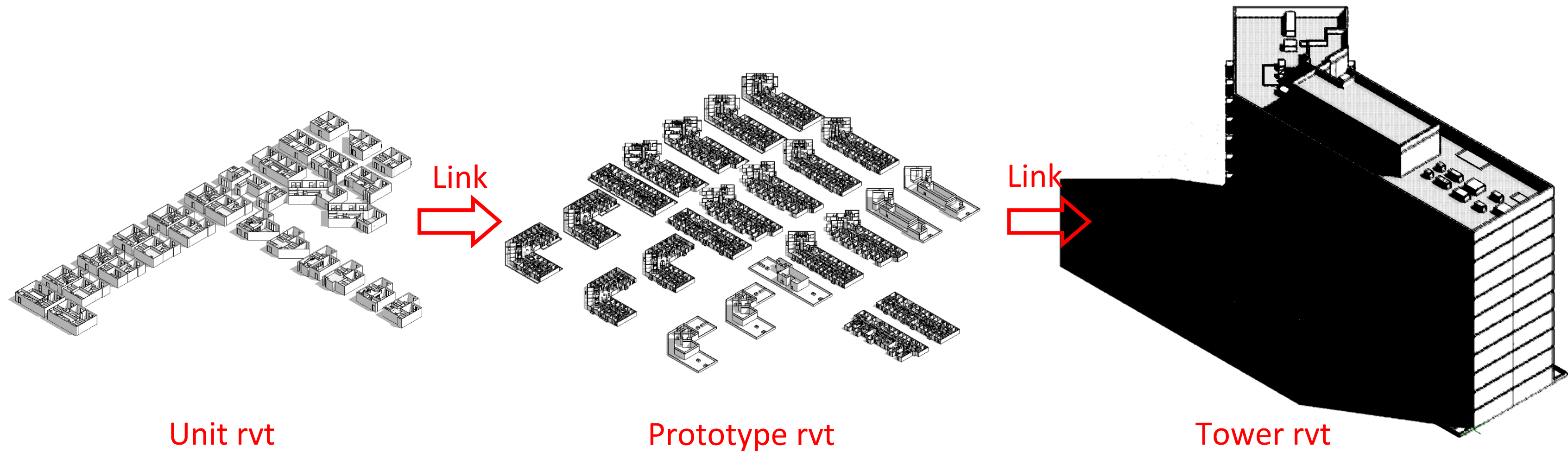
- Linking Strategy
- Single File Grouping Strategy
- Link + Group Strategy
- Multiple Files Grouping Strategy
- Family Strategy



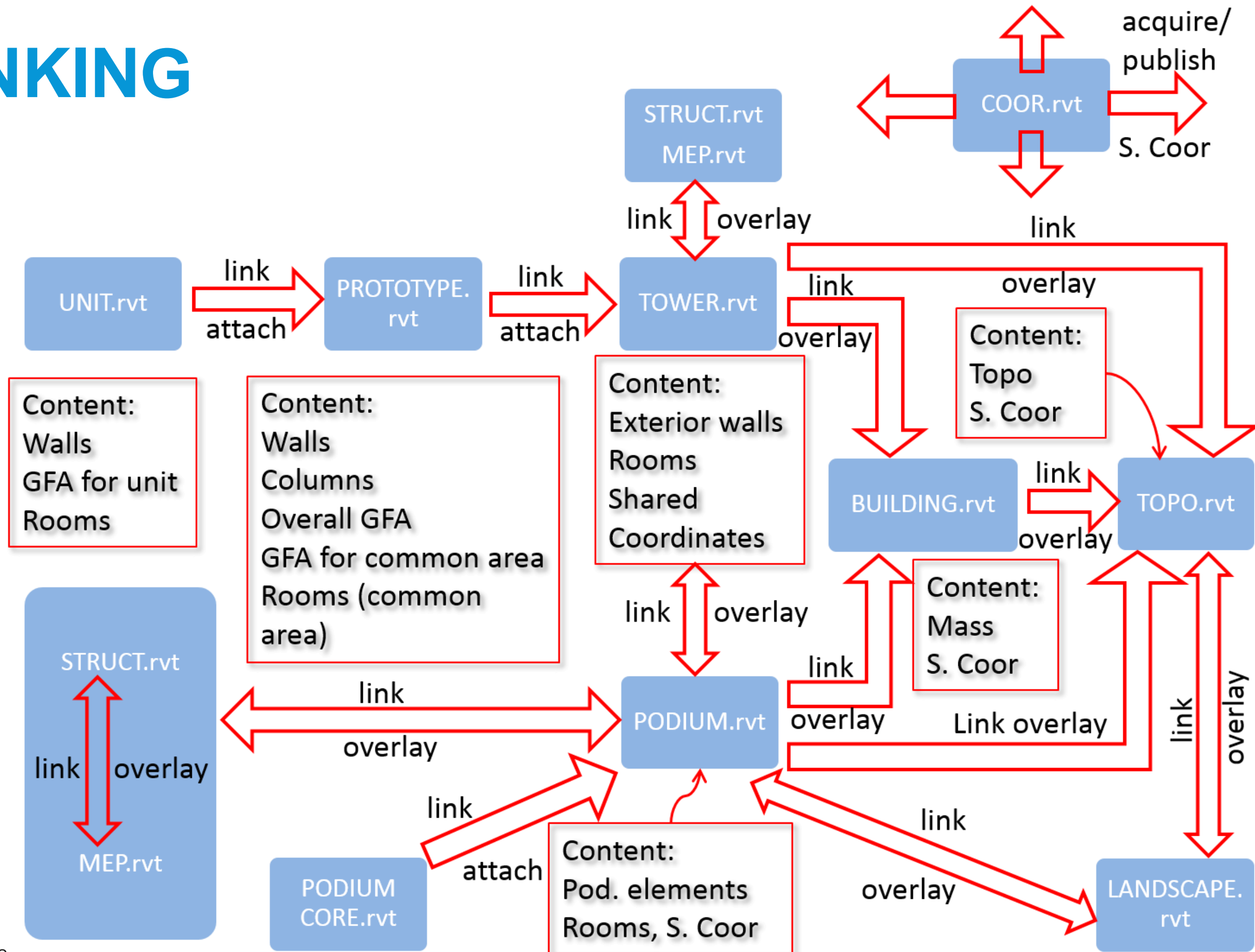
I. LINKING



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I. LINKING



I. LINKING

■ Towers:

- A1: 3 links, 6 nested links, 140 link instances
- A2: 3 links, 6 nested links, 168 link instances
- A3: 3 links, 6 nested links, 196 link instances
- A4: 4 links, 16 nested links, 198 link instances
- A5: 4 links, 21 nested links, 212 link instances
- B1: 3 links, 7 nested links, 111 link instances
- B2: 3 links, 7 nested links, 133 link instances
- B3: 4 links, 19 nested links, 157 link instances
- C2: 3 links, 8 nested links, 121 link instances
- C3: 3 links, 8 nested links, 145 link instances
- C4: 3 links, 8 nested links, 193 link instances

I. LINKING

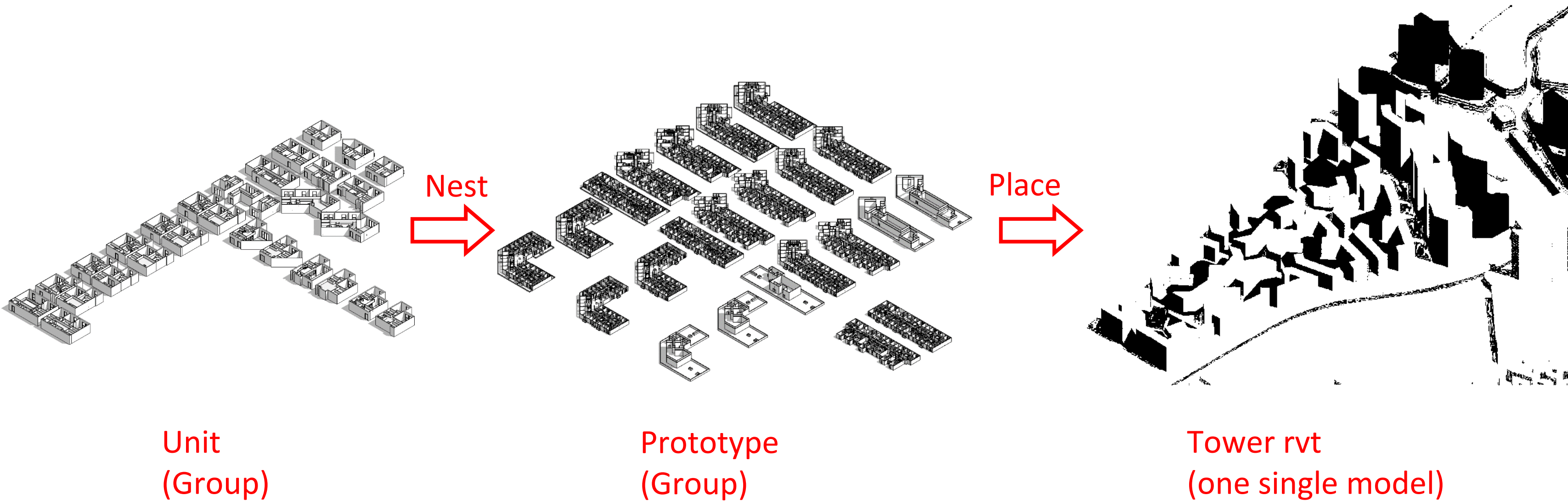
- Plots (completed building):
 - Plot 6: 4 links, 21 nested links, 730 link instances
 - Plot 7: 4 links, 22 nested links, 639 link instances
 - Plot 8 & 9: 6 links, 46 nested links, 897 link instances
 - Plot 10: 3 links, 30 nested links, 408 link instances
 - Plot 11: 4 links, 29 nested links, 591 link instances

Pros	Cons	Possible Solution
Edit Units and Prototypes in relatively small size project files.	Takes long time when opening Tower files, even longer in Building files.	Worksets to control load / unload of links. Upgrade computers, network?
System families in Unit and Prototypes files are easy to edit.	Tremendous amount of time for linking Tower to Structure or MEP.	Open/close worksets not work for attached link in 2 nd level link when linking arch models to MEP models. Upgrade computers, network?
Linking allows instant update of Units and Prototypes.	Computer clashes when working in Building files.	Upgrade computers, network?
	Elements cannot be scheduled by floor levels in Tower.	
	Copy / Monitor when linked to models of other disciplines not allowed.	

II. SINGLE FILE GROUPING



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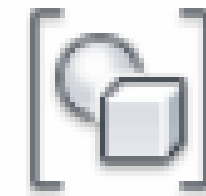
- Groups cannot be shared across projects, use a single file
- 30 Unit Groups (2962 group instances)
- 23 Prototypes Groups (278 group instances)
- 11 Tower Groups (20 group instances)
- Groups inside Group

Pros	Cons	Possible Solution
System families in groups are easy to edit.	Extremely huge file size (4G?)	Worksets to control load / unload elements. Upgrade computers, network?
No need to reload or link Units / Prototypes to different Towers.	Groups, groups inside group, mirroring groups will give errors.	Some elements may need to be excluded from group.
All components (families) are consistent in all Tower since it is a single file.	Updating large amount of group instances will take long time.	Upgrade computers, network?
Elements live in project allow scheduling by level.		
Allow Copy / Monitor when linked to models of other disciplines.		

III. LINKING + GROUPING

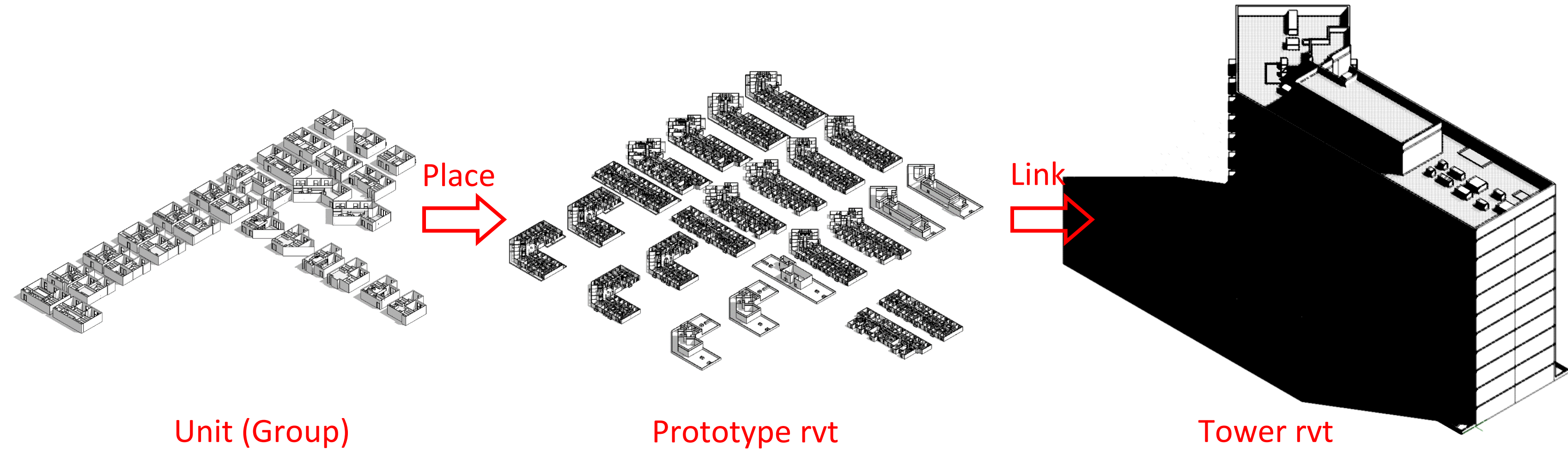


Link
Revit



Model
Group

III. LINKING + GROUPING

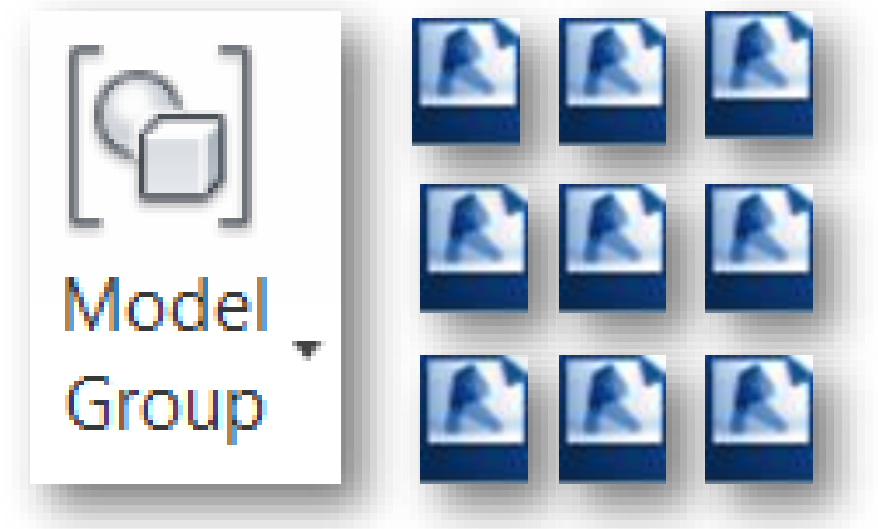


III. LINKING + GROUPING

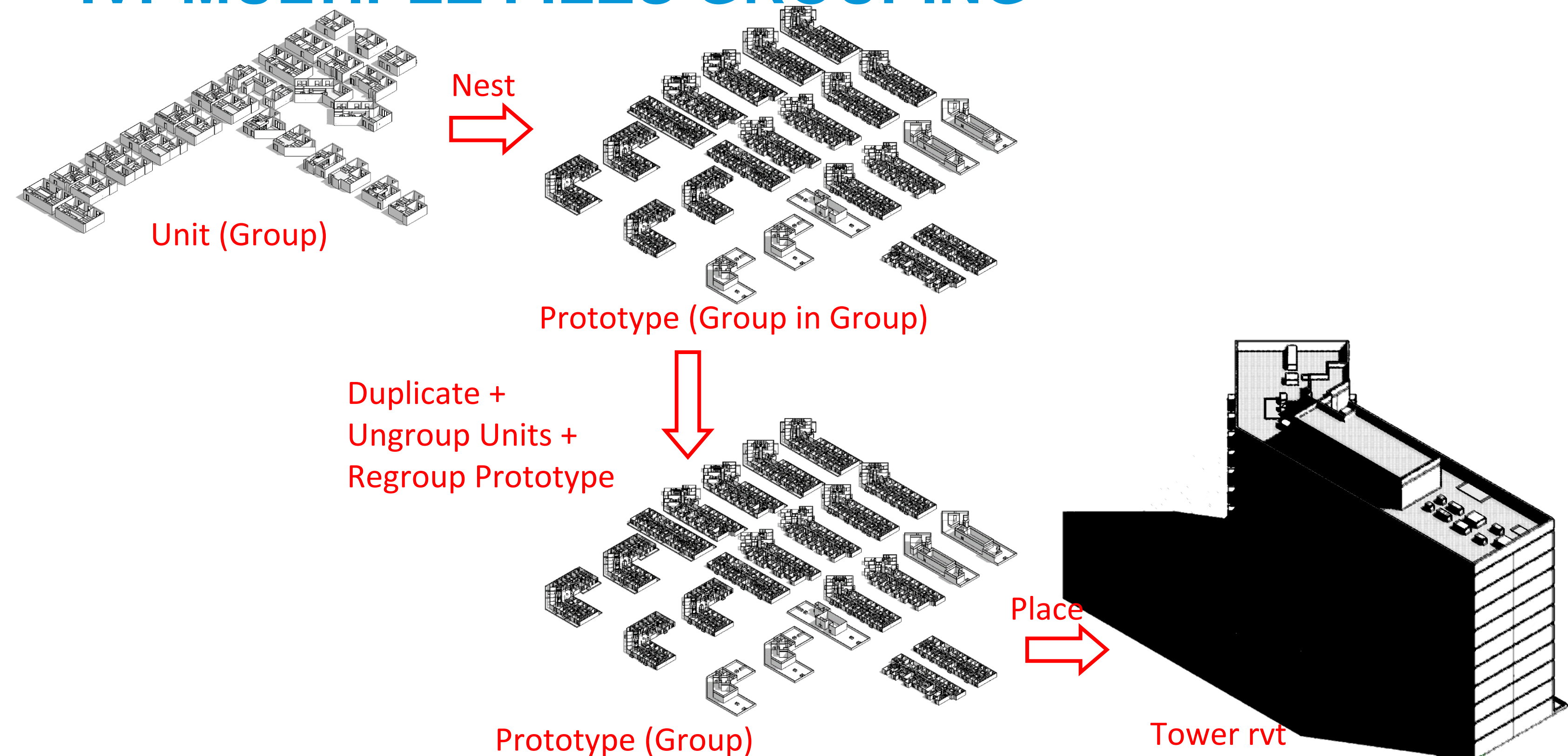
- Groups cannot be shared across projects, use a master file for Unit Groups, save groups out in Unit Group folder from which groups are reloaded to Prototype file
- 30 Unit Groups inside Prototype file (rvt)

Pros	Cons	Possible Solution
System families in groups are easy to edit.	Groups are defined in each project file but they need to be consistent in all files.	Create master file to maintain groups. Update groups in Prototype by reloading group from Unit Group folder
Number of link instances reduced as the large number of units are groups	Don't know if the groups in Prototypes are the most updated version from master file.	Manual checking.
	Mirroring groups will give errors.	Some elements may need to be excluded from group.
	Elements cannot be scheduled by floor levels in Tower.	
	Copy / Monitor when linked to models of other disciplines not allowed.	

IV. MULTIPLE FILES GROUPING



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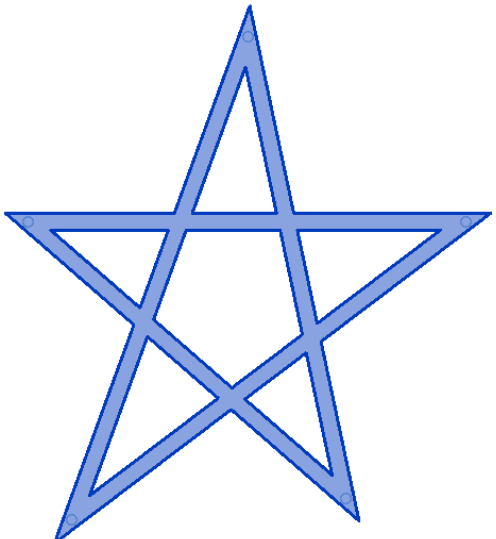
- Groups cannot be shared across projects, use a master file for Unit / Prototype Groups, save groups out in Group folder from which groups are reloaded to Tower files
- 30 Unit Groups
- 23 Prototypes Groups
- No Group inside Group, No Link

Pros	Cons	Possible Solution
System families in groups are easy to edit.	Groups are defined in each project file but they need to be consistent in all files.	Create master file to maintain groups. Update groups in by reloading group from Unit folder
No link.	Don't know if the groups in Prototypes are the most updated version from master file.	Manual checking.
Elements live in project allow scheduling by level.	Mirroring groups will give errors.	Some elements may need to be excluded from group.
Allow Copy / Monitor when linked to models of other disciplines.		

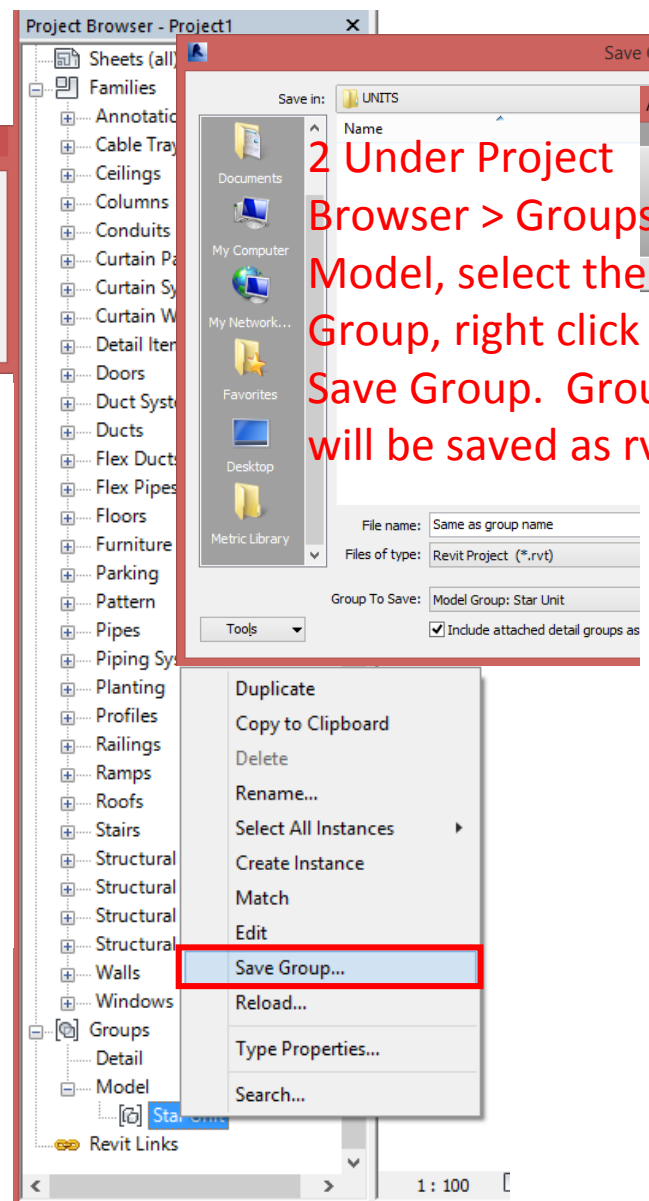
IV. MULTIPLE FILES GROUPING

■ MAINTAINING THE GROUPS IN MULTIPLE PROJECTS

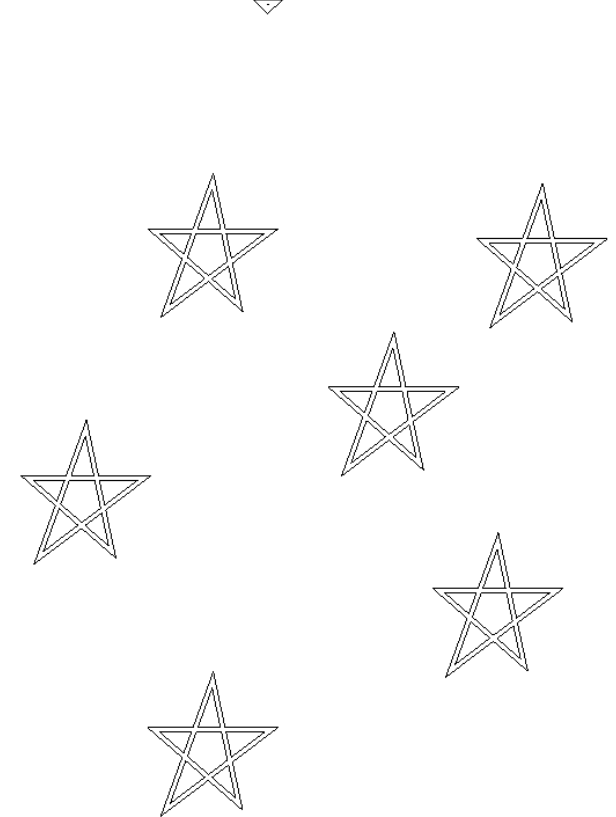
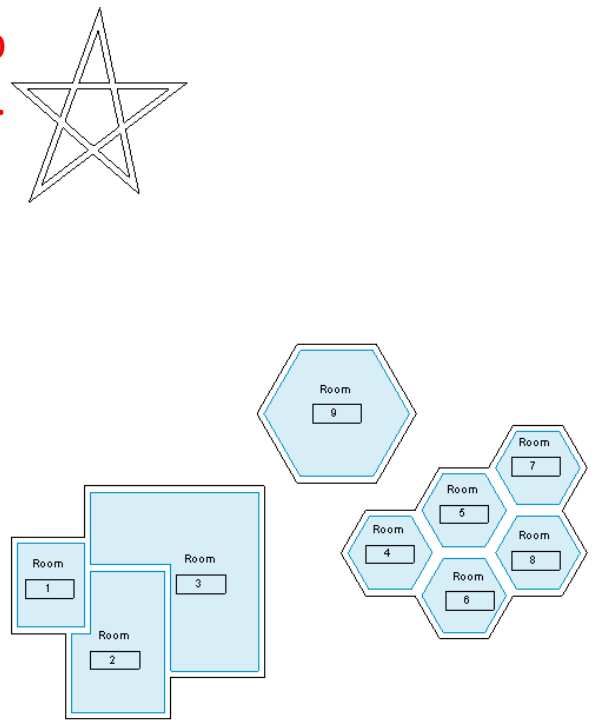
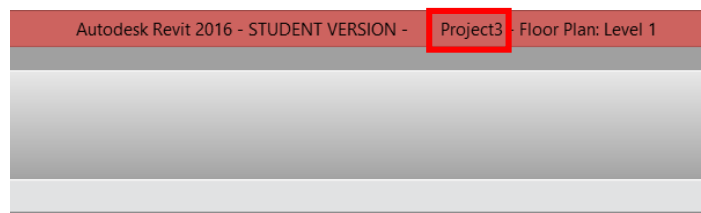
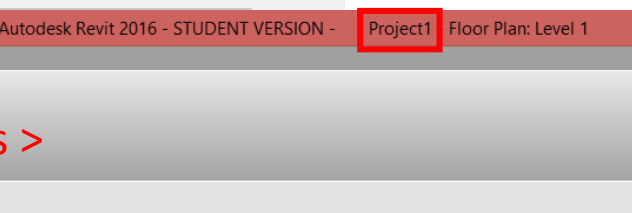
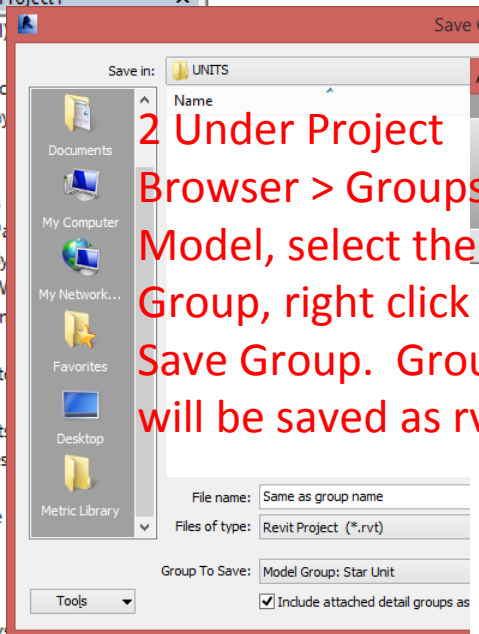
1 Create Model Group



2 Under Project Browser > Groups > Model, select the Group, right click Save Group. Group will be saved as rvt.



3 Copy the Group and paste in a new Project



IV. MULTIPLE FILES GROUPING

■ MAINTAINING THE GROUPS IN MULTIPLE PROJECTS

5 In both Project files, Reload the Group from the location where it was saved

4 Open the Unit Project file, make revision and save.

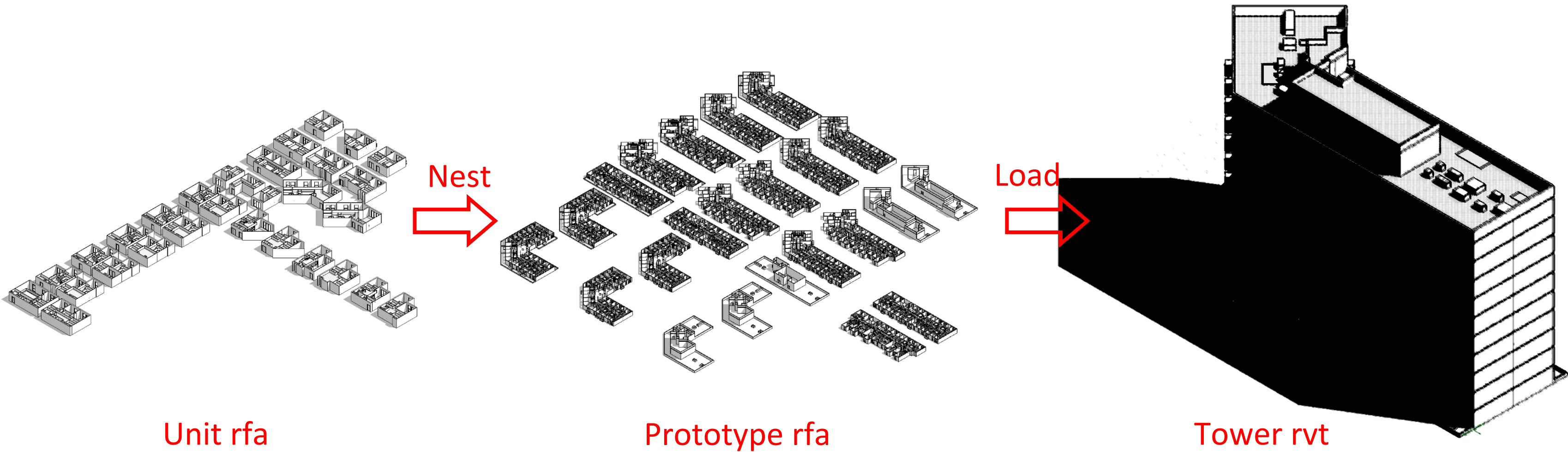
6 Group is updated in both Project files.

The image is a composite of several screenshots and diagrams. At the top, three Revit window titles are shown: 'Autodesk Revit 2016 - STUDENT VERSION - Star Unit.rvt - Floor Plan: Level 1', 'Autodesk Revit 2016 - STUDENT VERSION - Project1 - Floor Plan: Level 1', and 'Autodesk Revit 2016 - STUDENT VERSION - Project3 - Floor Plan: Level 1'. The first window shows a toolbar with 'Room' and 'Area' tools. A 'Load File as Group' dialog box is open, showing a file named 'Star Unit.rvt' with a date of '2016/6/16 下午 04:...' and type 'Autodesk Revit'. Below this, a context menu is shown with 'Reload...' highlighted. To the left, a large star-shaped room outline is shown. To the right, two diagrams show room groups: one with rooms 1, 2, 3, and 4, and another with rooms 5, 6, 7, 8, and 9. The text '5 In both Project files, Reload the Group from the location where it was saved' is overlaid on the top right. The text '4 Open the Unit Project file, make revision and save.' is overlaid on the bottom left. The text '6 Group is updated in both Project files.' is overlaid on the bottom right.

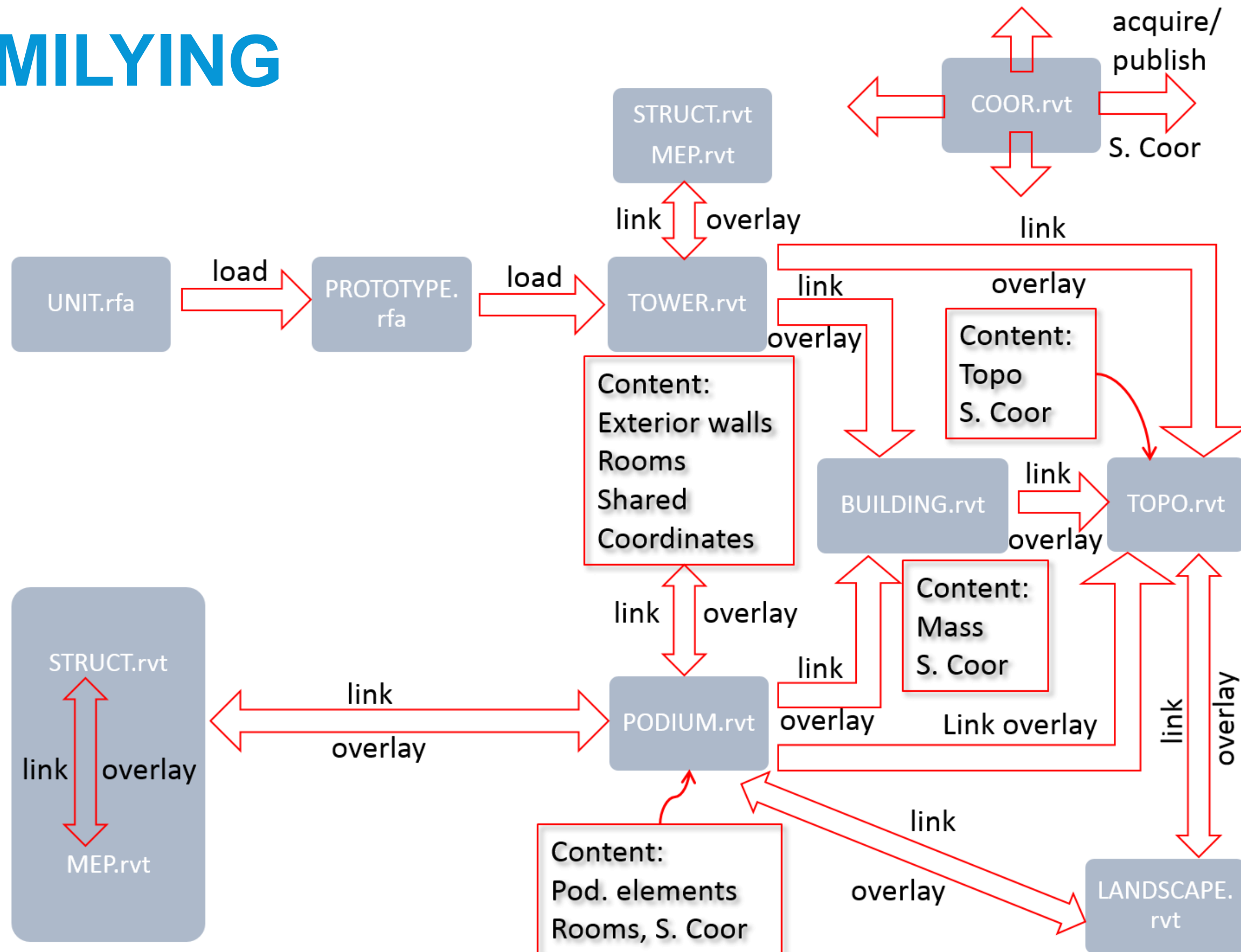
V. FAMILYING



V. FAMILYING

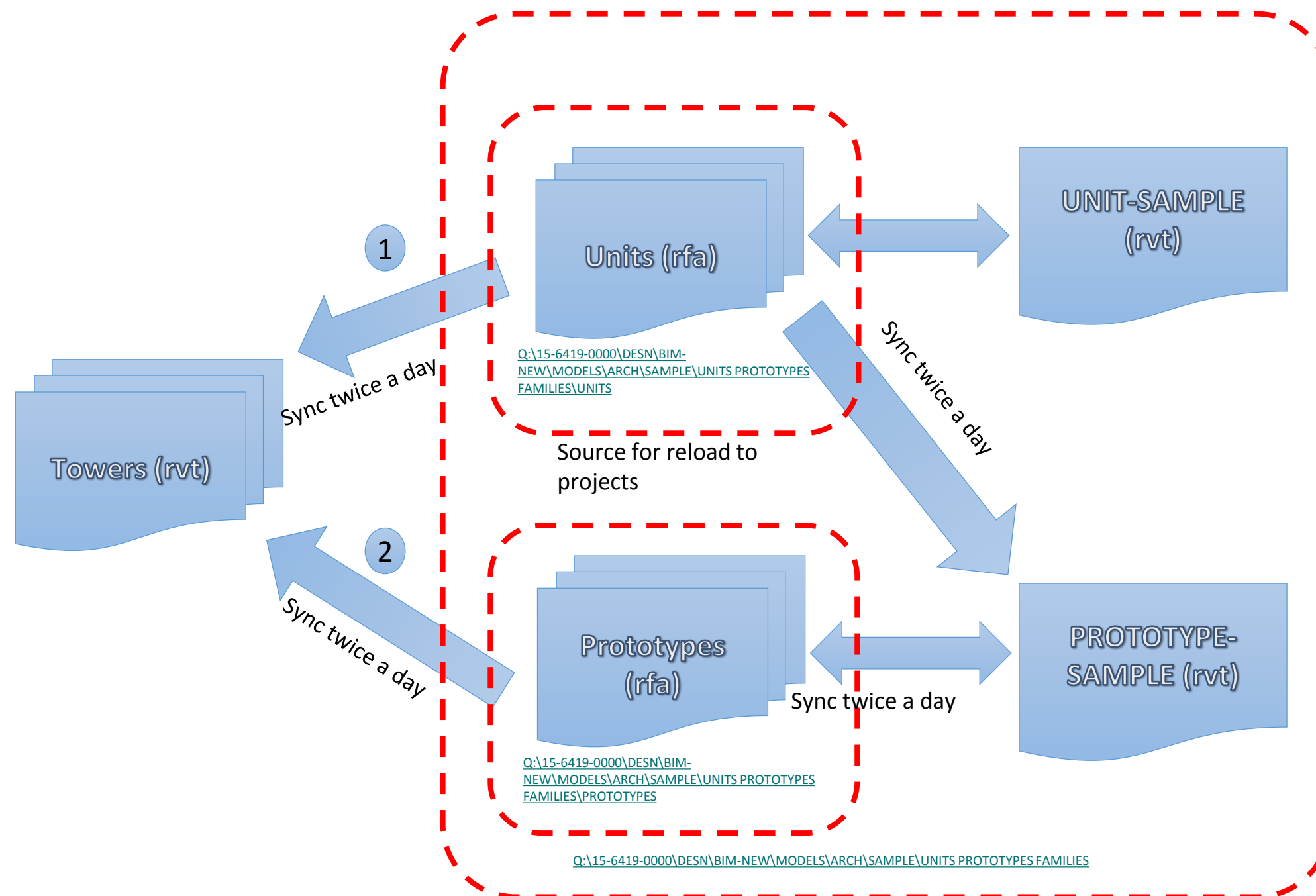


V. FAMILYING



V. FAMILYING

■ CREATING AND REVISING FAMILIES WORK FLOW



V. FAMILYING

■ UNIT FAMILY

- The Unit family needs to be a loadable family for it to be shared by multiple Tower models.
- The Unit family needs to be room bounding.
- The only room bounding element in Revit is wall which is a system family.
- How to create a loadable family with category of system family (wall, ceiling, railing, roof...)?

1 Create In- Place Family

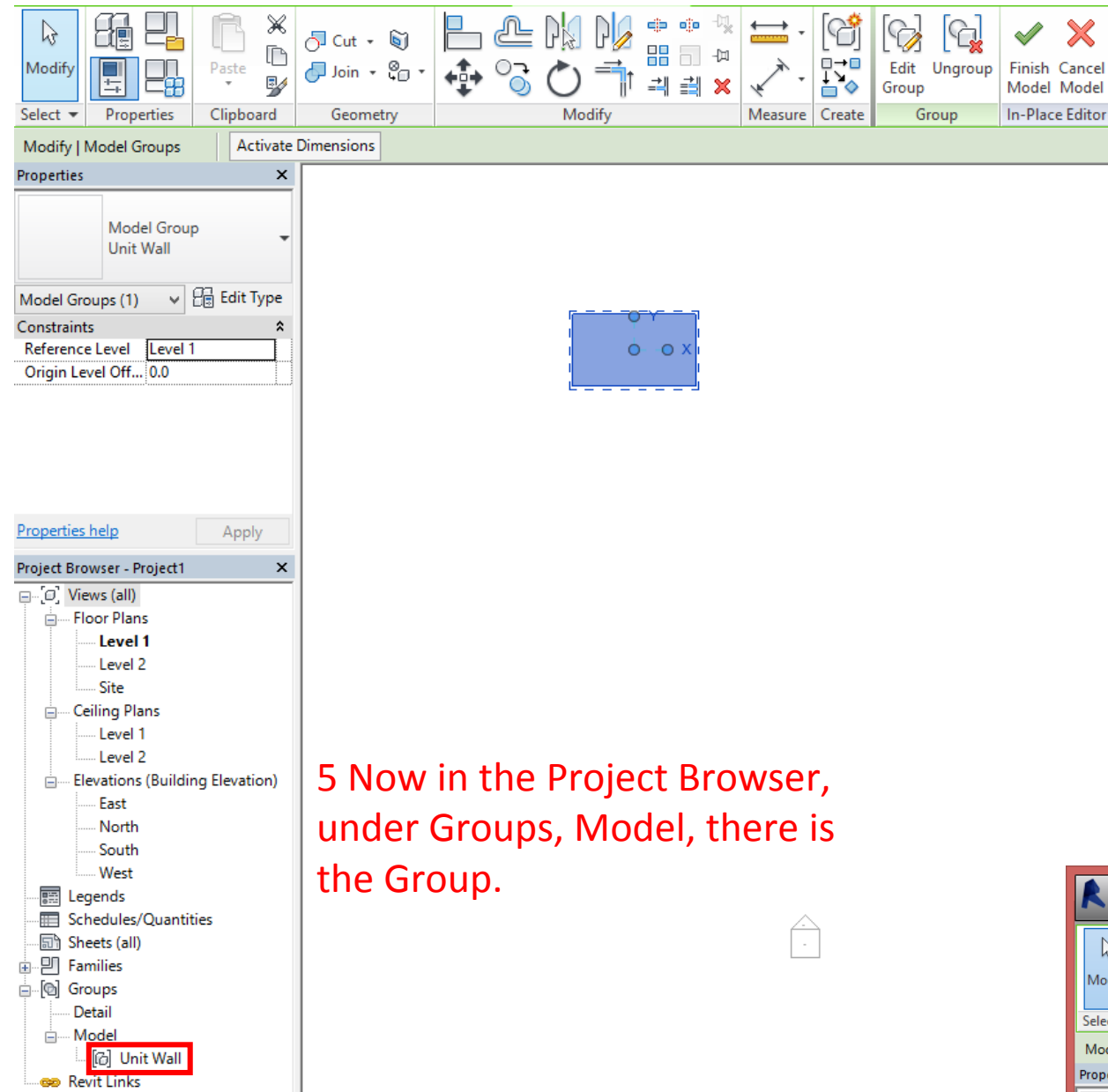
2 Select Walls as Family Category

3 Create an Extrusion

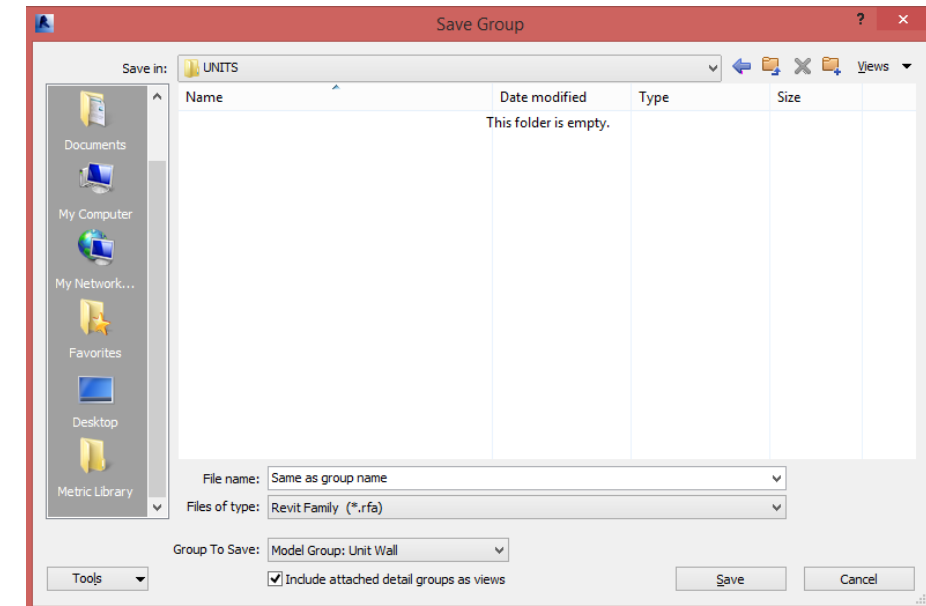
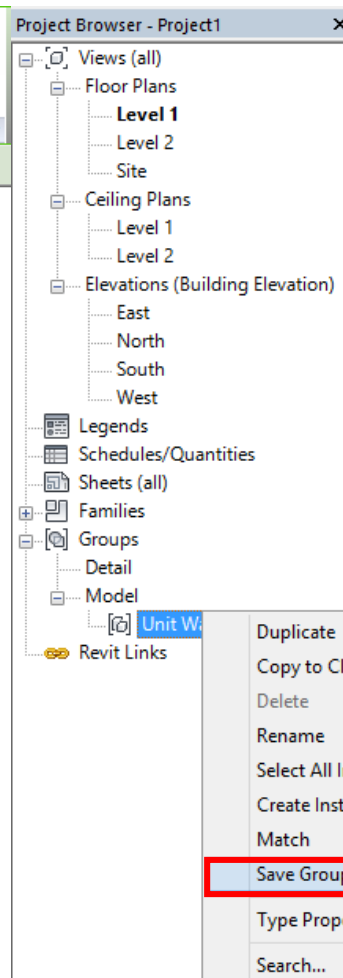
4 Before Finish Model, select the extrusion, group it

V. FAMILYING

UNIT FAMILY

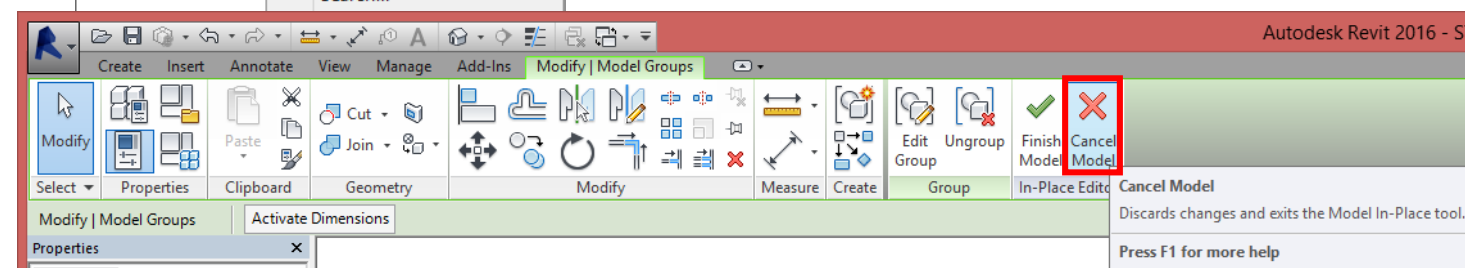


5 Now in the Project Browser, under Groups, Model, there is the Group.



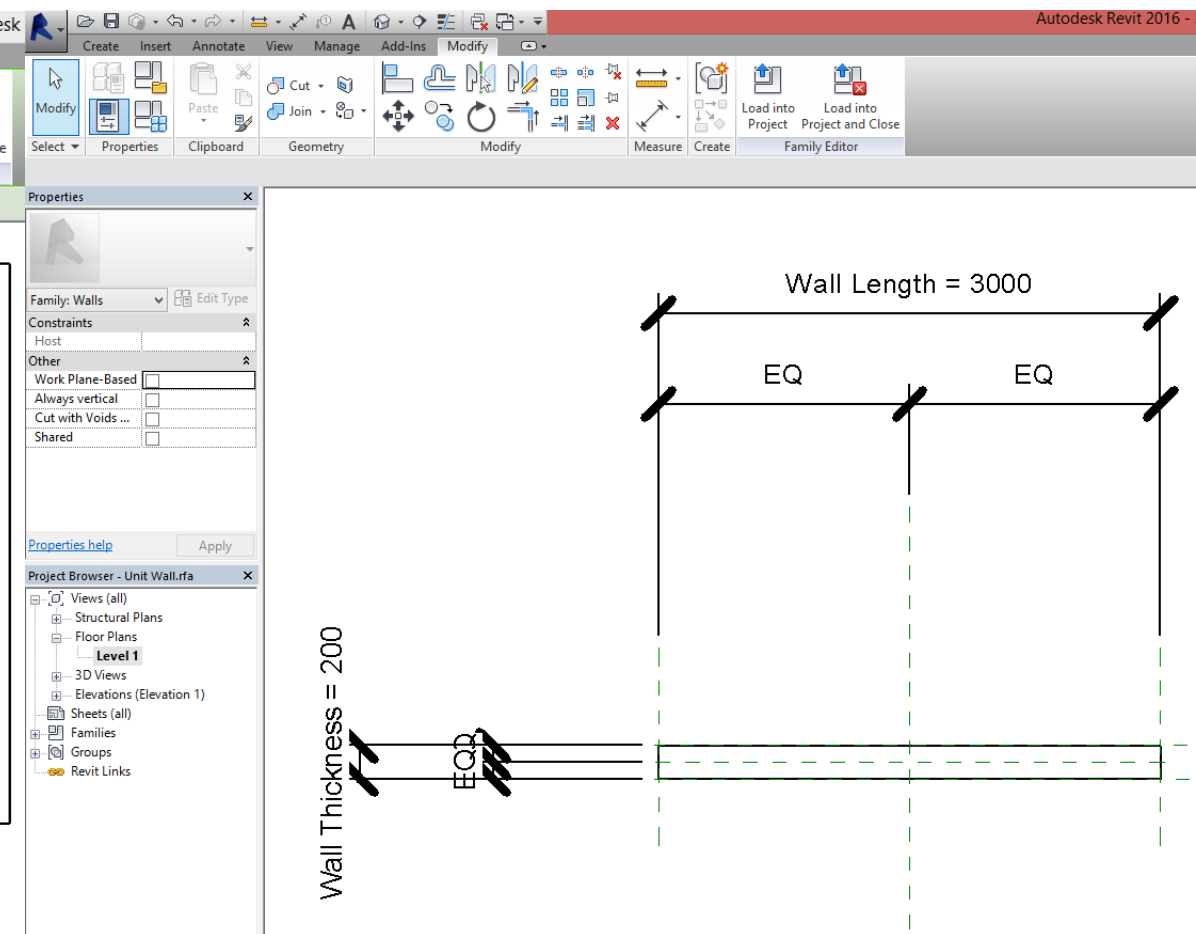
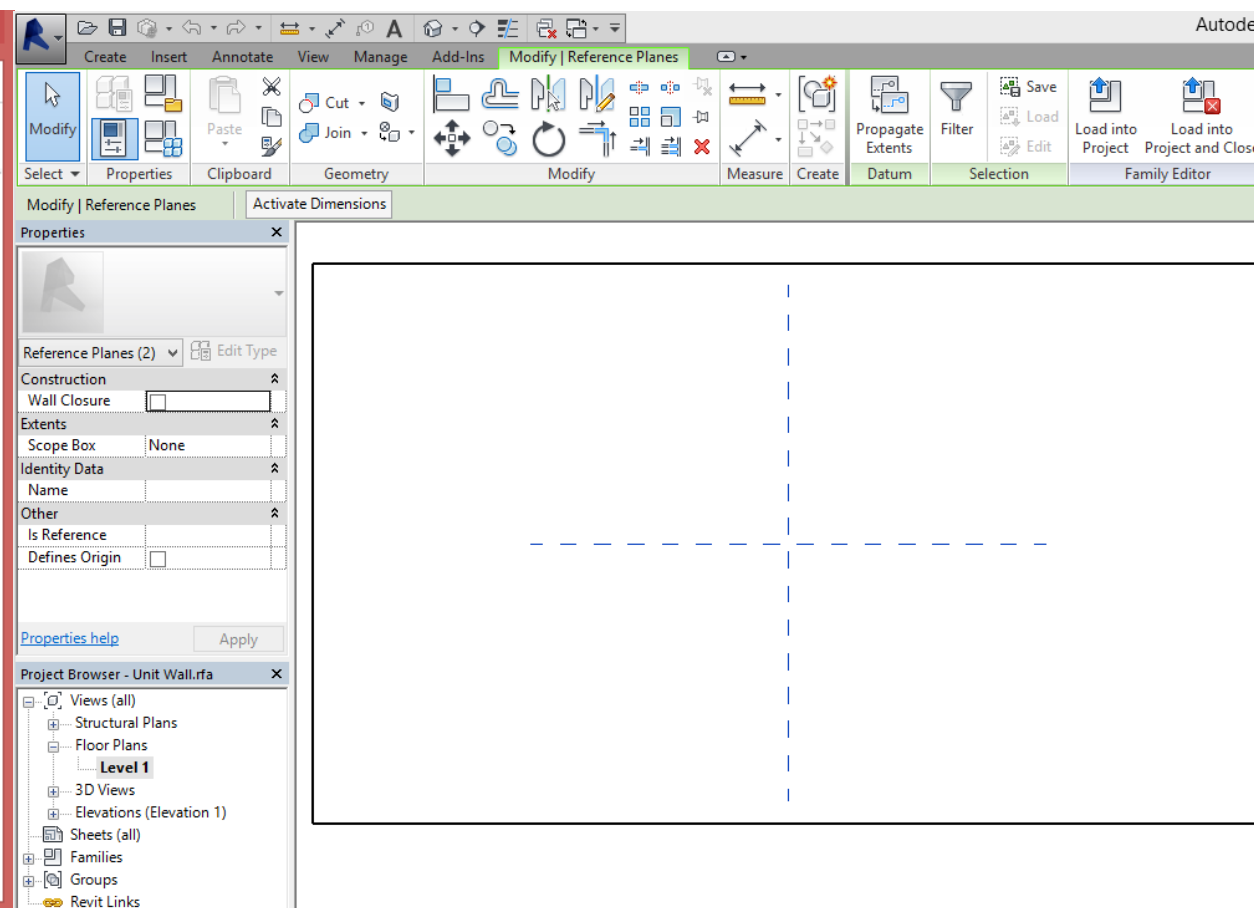
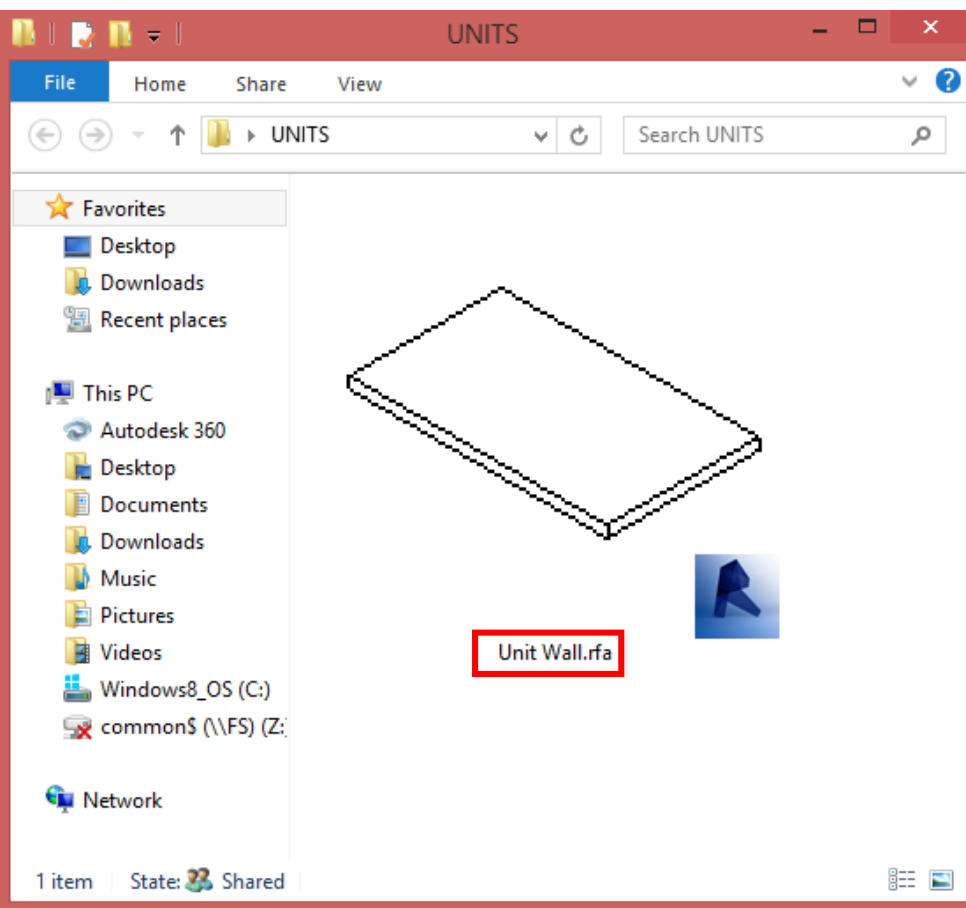
6 Right click on the Group, save the Group.

7 Cancel the In-Place Family.



V. FAMILYING

■ UNIT FAMILY



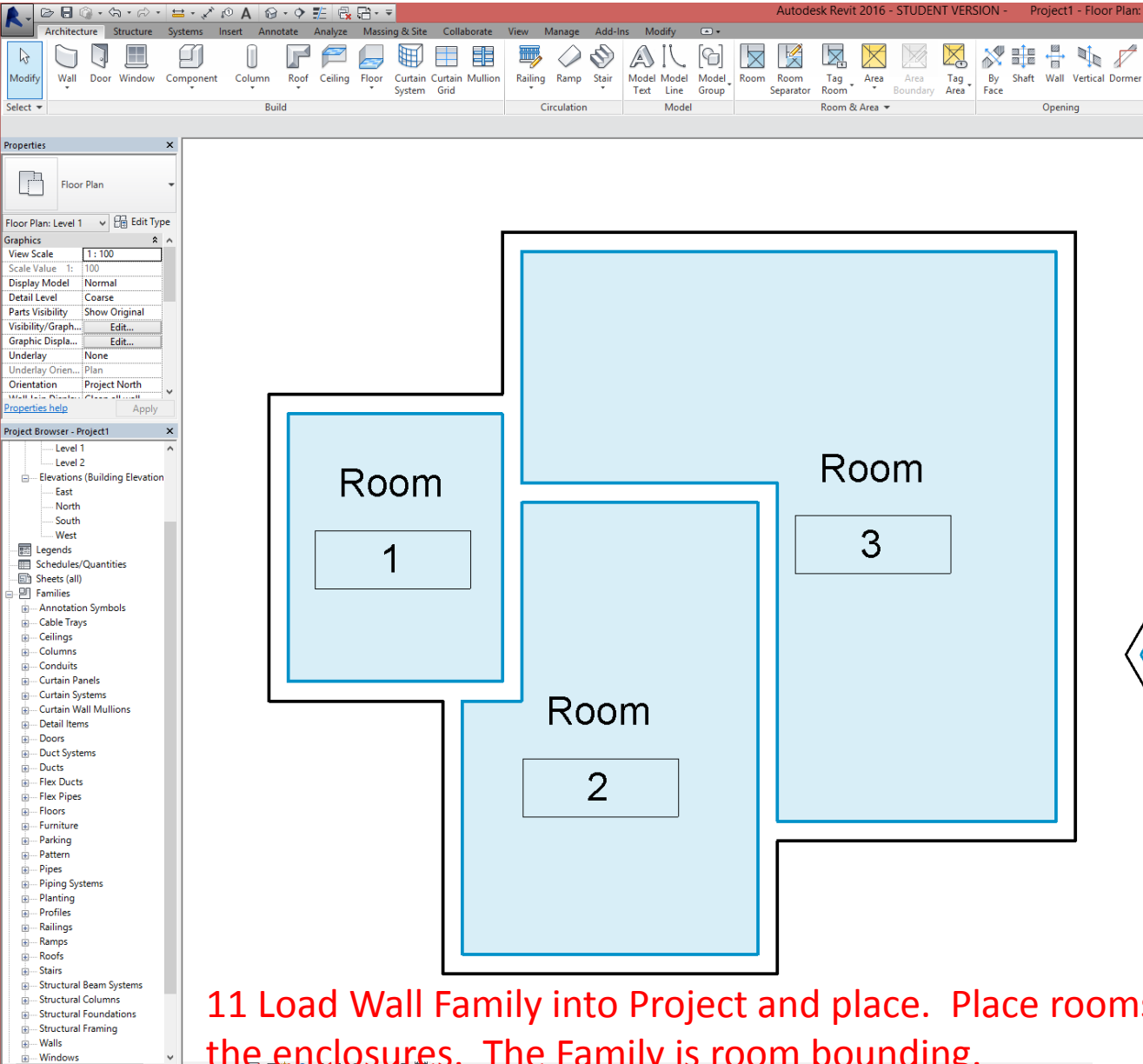
8 Now a Wall Family is created as a Component Family saved in a folder.

9 Open the Family and note there are the 2 reference planes as in any Family Template.

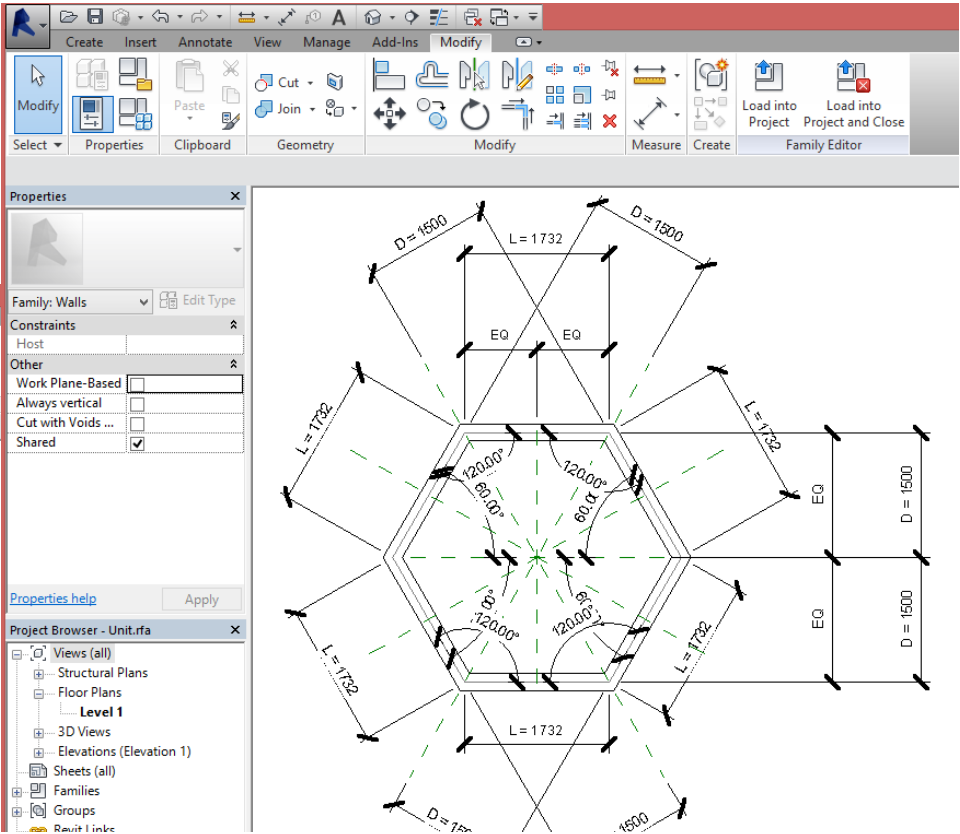
10 Modify the Family to make it parametric.

V. FAMILYING

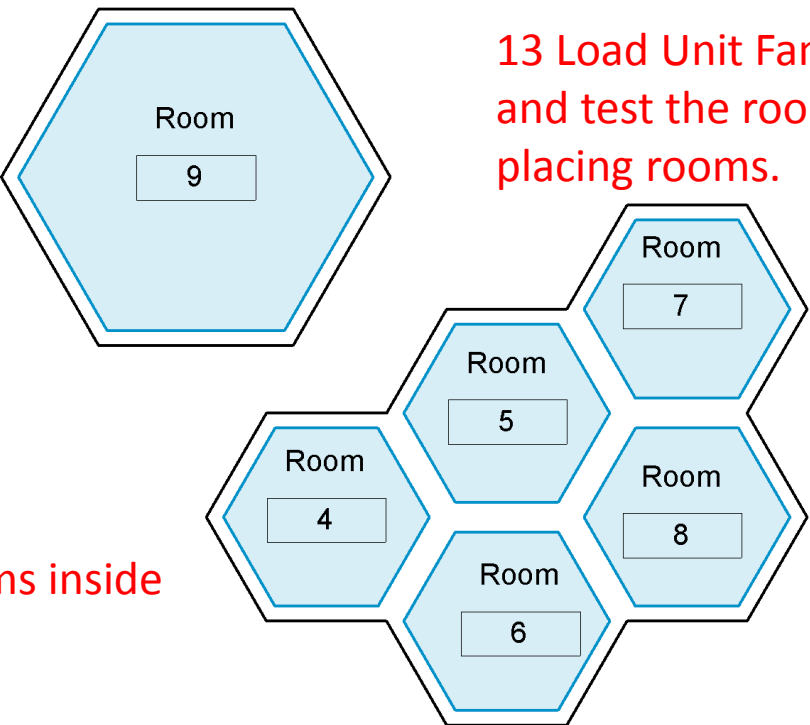
UNIT FAMILY



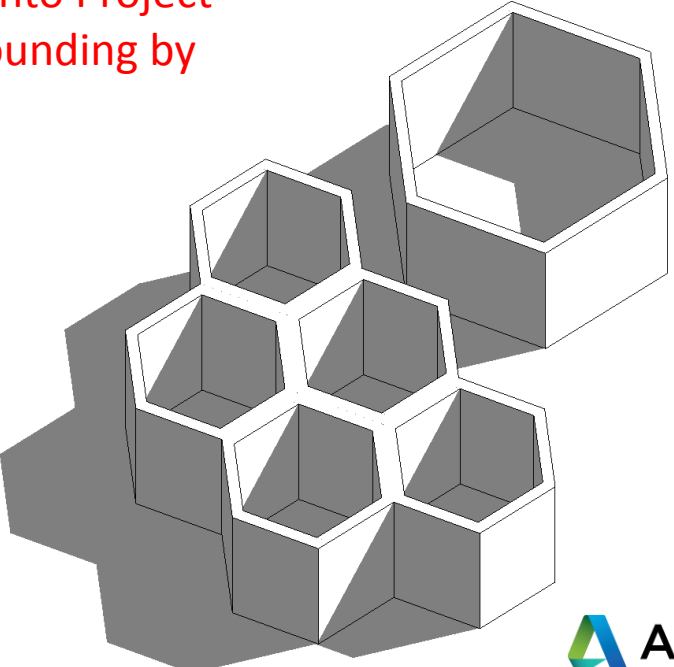
11 Load Wall Family into Project and place. Place rooms inside the enclosures. The Family is room bounding.



12 Similarly create a Unit Family by nesting the Wall Family into it.

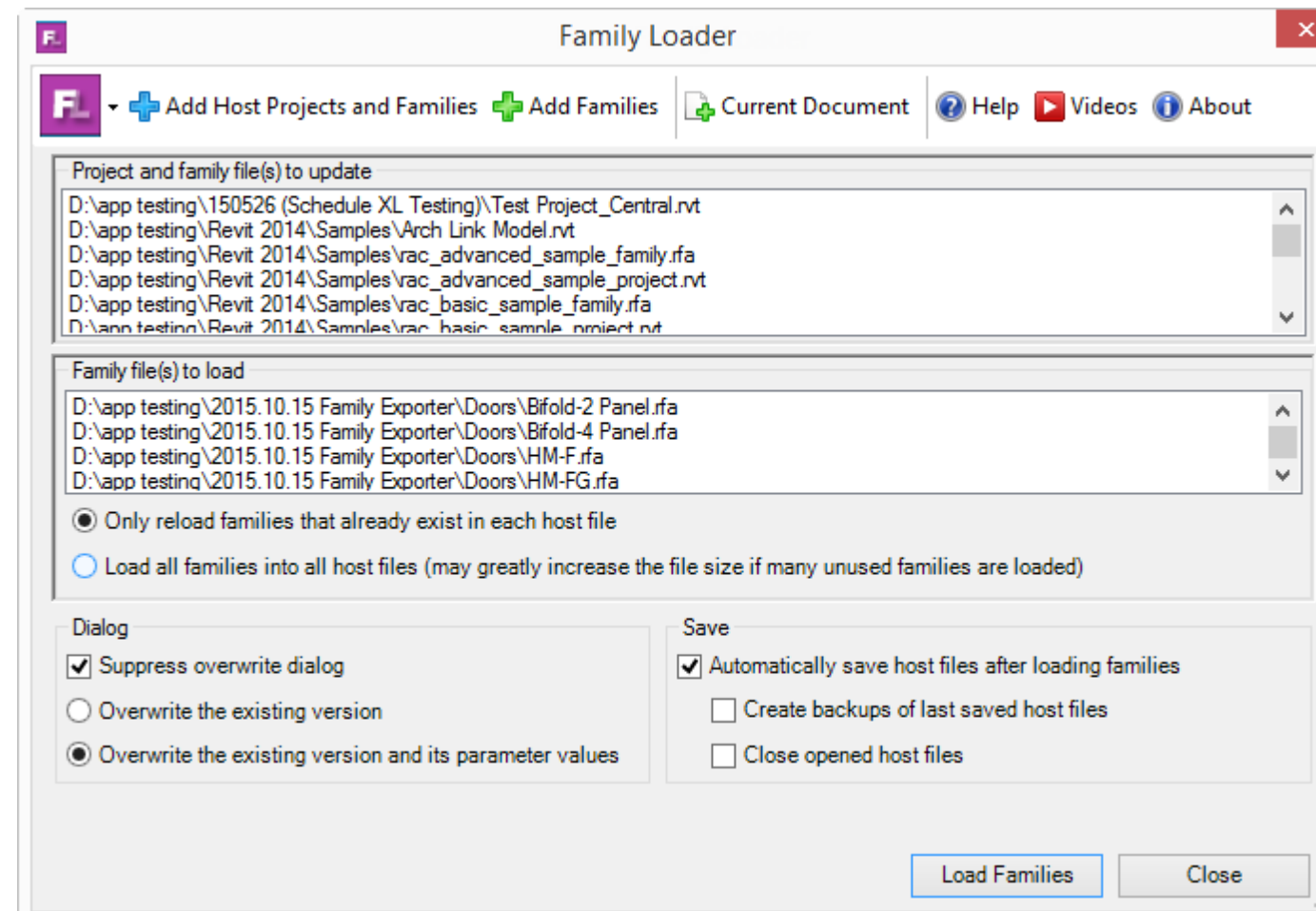


13 Load Unit Family into Project and test the room bounding by placing rooms.



V. FAMILYING

- RELOADING UNIT AND PROTOTYPE FAMILIES INTO PROJECTS
- Use Family Loader (<http://ctcexpresstools.com/product/bim-batch-suite-2017/>) to update more than one units and prototypes in all project files (twice a day, lunch hour and COB)



V. FAMILYING

- 30 Unit Families
- Unit Families nested to 23 Prototypes
- Prototypes loaded to 11 Tower projects

Pros	Cons	Possible Solution
Fast processing when opening Tower file or linking Tower to Structure or MEP.	Requires more skills and care in creating and maintaining families.	Users be more disciplined and more careful.
Edit Units and Prototypes in relatively small size family files.	Requires to load families to individual Tower file.	Use Batch Families Loader (Add-in).
Ensure all components (shared families) are consistent in all Tower file.	If families not created properly, it gives error and unable to load to project.	Audit / repair families and project files. Load families to Sample file to clean them up and then load families from Sample file to Tower files.
Elements live in project allow scheduling by level.		
Allow Copy / Monitor when linked to models of other disciplines.		

COMPARISON

	FAMILY STRATEGY	LINKING STRATEGY	SINGLE FILE GROUPING STRATEGY	LINK + GROUP STRATEGY	MULTIPLE FILES GROUPING STRATEGY
File Size	Medium	Small	Huge	Medium	Medium
Ease of Editing Units / Prototypes	Difficult	Easy	Easy but groups may give errors	Easy but groups may give errors	Easy but groups may give errors
Loading / Processing for Architecture Models	Easy	Difficult, extremely difficult in composite Building models	Difficult due to huge file size	Still a number of Prototype links, more difficult in composite Building models	Easy
Loading / Processing When Linking to Models of Other Disciplines	Easy	Extremely difficult	Difficult due to huge file size	Difficult	Easy
Update Units / Prototypes	Needs reload	Instant	Difficult, takes long time to update >2900 groups	Needs reload	Needs reload
Schedule Elements by Level	Yes	No	Yes	No	Yes
Copy / Monitor in Models of Other Disciplines	Yes	No	Yes	No	Yes

THANK YOU

**NO MATTER WHAT
THE SITUATION,
REMINDE YOURSELF
“I HAVE A
CHOICE.”**

DEEPAK CHOPRA



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